

Science Bowl Questions 1994

Round 11

Toss-Up

1. ASTR; Multiple Choice: A red shift in the light spectrum from a distant interstellar object indicates:
 - a) the object is moving towards the earth
 - b) the object is moving away from the earth
 - c) the object is stationary with respect to the earth
 - d) the object is orbiting the earth

ANSWER: B – THE OBJECT IS MOVING AWAY FROM THE EARTH

Bonus

1. ASTR; Short Answer: What is the name for the shift in the light spectrum?

ANSWER: THE DOPPLER SHIFT (ACCEPT DOPPLER EFFECT)

Toss-Up

2. BIOL; Multiple Choice: Clamp connections are characteristic of the hyphae of which of the following groups of Fungi?
 - a) Club Fungi
 - b) Imperfect Fungi
 - c) Molds
 - d) Sac Fungi

ANSWER: A – CLUB FUNGI

Bonus

2. BIOL; Short Answer: In which organelle are lipids synthesized?

ANSWER: SMOOTH ENDOPLASMIC RETICULUM

Toss-Up

3. PHYS; Multiple Choice: A transformer has 40 turns on the low winding and 200 turns on the high winding. If a source of 50 volts and 10 amps is inputted into the low winding, what is the output on the high winding?
- a) 250 volts and 50 amps
 - b) 250 volts and 2 amps
 - c) 10 volts and 50 amps
 - d) 10 volts and 2 amps

ANSWER: B – 250 VOLTS AND 2 AMPS

Bonus

3. PHYS; Multiple Choice: A car accelerates uniformly from rest to a speed of 20 m/s at the end of 1 minute; it then accelerates uniformly to a speed of 40 meters/second (m/s) at the end of the second minute. During this two minute period, the average speed of the car is:
- a) 7.5 m/s
 - b) 15 m/s
 - c) 20 m/s
 - d) 30 m/s

ANSWER: C – 20 m/s

Toss-Up

4. CHEM; Short Answer: Who was the first chemist to use letters as symbols for elements?

ANSWER: (JONS JACOB) BERZELIUS

Bonus

4. CHEM; Short Answer: How many pi bonds and how many sigma bond make up a triple bond?

ANSWER: ONE SIGMA BOND AND TWO PI BONDS

Toss-Up

5. GENR; Short Answer: What musical key do most American car horns beep in?

ANSWER: F

Bonus

5. GENR; Short Answer: Who oversaw the design and assembly of the first atomic bomb at Los Alamos?

ANSWER: J. ROBERT OPPENHEIMER

Toss-Up

6. COMP; Short Answer: Place the following programming languages in chronological order with regard to their first introduction to the computing public:

BASIC, ALGOL, Pascal, FORTRAN

ANSWER: FORTRAN, ALGOL, BASIC, PASCAL

Bonus

6. COMP; Multiple Choice: Which of the following computers would implement the method of processing in which one operation is completed before the next operation is initiated?

- a) analog
- b) digital
- c) asynchronous
- d) synchronous

ANSWER: C - ASYNCHRONOUS

Toss-Up

7. CHEM; Short Answer: Glucose is one of the simple sugars in sucrose. Name the other.

ANSWER: FRUCTOSE

Bonus

7. CHEM; Short Answer: What is the empirical formula for fructose?

ANSWER: CH_2O

Toss-Up

8. BIOL; Short Answer: E. coli is a bacterium commonly found in the human intestine. Under ideal growth conditions this organism can reproduce every 20 minutes. Given a population of 100 E. coli existing under ideal conditions. How many will there be after 1 hour?

ANSWER: 800

Bonus

8. BIOL; Multiple Choice: Which of the following groups have members with a primary photosynthetic pigment which absorbs red light?
- a) Green algae
 - b) Plasmodial slime molds
 - c) Purple halobacteria
 - d) Water molds

ANSWER: A – GREEN ALGAE

Toss-Up

9. PHYS; Multiple Choice: On a graph that shows velocity on the vertical axis and time on the horizontal axis, the area under the curve represents:
- a) average acceleration
 - b) average velocity
 - c) average speed
 - d) displacement

ANSWER: D – DISPLACEMENT

Bonus

9. PHYS; Multiple Choice: Approximately how long does it take a ball weighing 10 Kg to fall from rest, off the top of a 125 meter building to the ground?
- a) 1 second
 - b) 2 seconds
 - c) 5 seconds
 - d) 7 seconds

ANSWER: C – 5 SECONDS

Toss-Up

10. ERSC; Multiple Choice: which ore of iron contains the greatest percentage of iron?
- a) Hematite
 - b) Magnetite
 - c) Pyrite
 - d) Siderite

ANSWER: B - MAGNETITE

Bonus

10. ERSC; Short Answer: What product is made from heating coal to high temperatures without air?

ANSWER: COKE

Toss-Up

11. BIOL; Multiple Choice: You are a passenger on an airplane which takes off in the desert, passes over grasslands, and lands in eastern deciduous forest. The route of your flight was from:
- a) Los Angeles to Oklahoma City
 - b) New York to Los Angeles
 - c) Phoenix to Atlanta
 - d) San Diego to Seattle

ANSWER: C – PHOENIX TO ATLANTA

11. BIOL; Multiple Choice: Which of the following is an example of cryptic coloration?
- a) a minnow with eyespots on its tail
 - b) a yellow crab spider on goldenrod flowers
 - c) the green color of a plant
 - d) the white stripe of a skunk

ANSWER: B – A YELLOW CRAB SPIDER ON GOLDENROD FLOWERS

Toss-Up

12. PHYS; Multiple Choice: In a fiber optic transmission system, an optical source is operating at a wavelength of 1310 nanometers. What is the frequency of the source?
- a) 229 megahertz
 - b) 229 terahertz
 - c) 229 millihertz
 - d) 229 gigahertz

ANSWER: B – 229 TERAHERTZ

Bonus

12. PHYS; Multiple Choice: The change in velocity for some time interval can be interpreted as:
- a) the area under the v-versus-t curve for that interval
 - b) the area under the x-versus-t curve for that interval
 - c) the area under the a-versus-t curve for that interval
 - d) the slope of the a-versus-t curve

ANSWER: C – THE AREA UNDER THE A-VERSUS-T CURVE FOR THAT INTERVAL

Toss-Up

13. CHEM; Short Answer: What metal ion is found in chlorophyll?

ANSWER: MAGNESIUM ION

Bonus

13. CHEM; Short Answer: The most common complex ions have octahedral geometry. What is the coordination number of the central ion in an octahedral complex?

ANSWER: SIX

Toss-Up

14. MATH; Short Answer: If X to the three-fourths power equals eight, then what is the value of X?

ANSWER: SIXTEEN (16)

Bonus

14. MATH; Multiple Choice: In statistics, the standard deviation measures:

- a) a standard distance
- b) a normal distance
- c) central tendency
- d) dispersion

ANSWER: D – DISPERSION

Toss-Up

15. GENR; Short Answer: Who invented peanut butter?

ANSWER: GEORGE WASHINGTON CARVER

Bonus

15. GENR; Short Answer: What Cherokee Indian gave his name to a tree?

ANSWER: SEQUOYA

Toss-Up

16. BIOL; Multiple Choice: A pale yellow, funnel-shaped, sweetly scented flower which produces relatively large amounts of nectar is adapted to be pollinated by which of the following organisms?

- a) Bumblebees
- b) Butterflies
- c) Hummingbirds
- d) Nocturnal moths

ANSWER: D – NOCTURNAL MOTHS

Bonus

16. BIOL; Multiple Choice: Which of the following scientists is associated with the theory of evolution through the inheritance of acquired characteristics?

- a) Darwin
- b) Lamarck
- c) Morgan
- d) Wallace

ANSWER: B – LAMARCK

Toss-Up

17. ASTR; Multiple Choice: What is the approximate escape velocity for the Earth?

- a) 10,000 mph
- b) 17,000 mph
- c) 25,000 mph
- d) 50,000 mph

ANSWER: C – 25,000 MPH

Bonus

17. ASTR; Short Answer: What is the closest spiral galaxy to the Milky Way galaxy?

ANSWER: ANDROMEDA GALAXY (ACCEPT M31 OR MESSIER 31)

Toss-Up

18. PHYS; Multiple Choice: The function of series capacitance on a high voltage transmission line is to:

- a) improve DC transmission
- b) suppress harmonics
- c) eliminate DC transmission
- d) none of the above

ANSWER: C – ELIMINATE DC TRANSMISSION

Bonus

18. PHYS; Multiple Choice: A river is 0.6 kilometer (km) wide. The banks are straight and parallel. The current is 5.0 km/h and is parallel to the banks. A boat has a maximum speed of 3 km/h in still water. The pilot of the boat wishes to travel in a straight line from A to B, where AB is perpendicular to the banks. The pilot should:

- a) head directly across the river
- b) head 68 degrees upstream from the line AB
- c) head 22 degrees upstream from the line AB
- d) give up, the trip is not possible in this boat

ANSWER: D – GIVE UP, THE TRIP IS NOT POSSIBLE IN THIS BOAT

Toss-Up

19. CHEM; Short Answer: Under standard conditions, which element has the lowest boiling point?

ANSWER: HELIUM

Bonus

19. CHEM; Short Answer: What American first proposed the free energy function G , which interrelates entropy and enthalpy?

ANSWER: (J. WILLARD) GIBBS

Toss-Up

20. ERSC; Short Answer: The outermost 100 kilometer (km) of the earth is called the lithosphere. Name the region below the lithosphere which is a depth of 100 km to 350 below the surface of the earth

ANSWER: ASTHENOSPHERE

Bonus

20. ERSC; Short Answer: Name the region that extends from 350 km to 2883 km below the earth's surface

ANSWER: MESOSPHERE

Toss-Up

21. COMP; Multiple Choice: Who named the algebra concerned with two-state variables?

- a) Blaise Pascal
- b) Issac Newton
- c) George Boole
- d) Albert Einstein

ANSWER: C – GEORGE BOOLE

Bonus

21. COMP; Multiple Choice: Of the following scientists, who co-authored the first book on programming?

- a) Maurice V. Wilkes
- b) John von Neumann
- c) Thomas J. Watson
- d) Rosalind Franklin

ANSWER: A – MAURICE V. WILKES

Toss-Up

22. BIOL; Multiple Choice: Which of the following will be true of the gametophyte of a homosporous plant?

- a) it will have both antheridia and archegonia
- b) it will have only antheridia
- c) it will have only archegonia
- d) it will have hermaphroditic flowers

ANSWER: A – IT WILL HAVE BOTH ANTHERIDIA AND ARCHEGONIA

Bonus

22. BIOL; Multiple Choice: On an autumn trip to the Scottish moorlands you observe that male red grouse are uniformly distributed throughout their habitat. What is the most probable explanation for this observation?

- a) food is uniformly distributed throughout this habitat
- b) males are competing for individual breeding territories
- c) predators are uniformly distributed throughout this habitat
- d) shelter is uniformly distributed throughout this habitat

ANSWER: B – MALES ARE COMPETING FOR INDIVIDUAL BREEDING TERRITORIES

Toss-Up

23. MATH; Multiple Choice: Mathematical “models” of physical systems are constructed to simulate systems and predict their behavior. One often-used stochastic approach in such models is:
- a) the method of nines
 - b) Bulerian topography
 - c) Arrhenius laws
 - d) the Monte Carlo technique

ANSWER: D – THE MONTE CARLO TECHNIQUE

Bonus

23. MATH; Short Answer: When a hypothesis is tested by experiment, there are two classical types of sampling errors that must be acknowledged, type I error and type II error. These two error types are important for the interpretation of the results. Which two Greek letters are typically used to represent the type I error and the type II error, respectively?

ANSWER: ALPHA AND BETA

Toss-Up

24. PHYS; Multiple Choice: Which of the following is not used by high-voltage power circuit breakers for arc quenching insulation?
- a) oil
 - b) vacuum
 - c) sulphur hexafluoride gas (SF₆)
 - d) water

ANSWER: D - WATER

Bonus

24. PHYS; Multiple Choice: A projectile is fired with an initial speed of 1000 meters per second (m/s) at an angle of 37 degrees above the horizontal. If air resistance is neglected, what is the approximate horizontal component of the projectile’s velocity after 20 seconds?
- a) 600 m/s
 - b) 800 m/s
 - c) 640 m/s
 - d) 160 m/s

ANSWER: B – 800 m/s

Toss-Up

25. CHEM; Short Answer: Which scientist first determined the atomic number of an atom by use of X-rays?

ANSWER: MOSELEY

Bonus

25. CHEM; Short Answer: Who first synthesized a Xenon compound?

ANSWER: (NEIL) BARTLETT
